Notes on Completion: Please refer to the appropriate NIA Governance Document to assist in the completion of this form. The full completed submission should not exceed 6 pages in total.

NIA Project Registration and PEA Document

Date of Submission

Feb 2014

Project Reference Number

NIA_NGET0104

Project Registration

Project Title

Proof of Concept for IEC61850 Process Bus Technology

Project Reference Number

NIA_NGET0104

Project Licensee(s)

National Grid Electricity Transmission

Project Start

August 2013

Project Duration

4 years and 7 months

Nominated Project Contact(s)

Martin Carpenter

Project Budget

£146,000.00

Summary

The purpose of the trial is to demonstrate the benefits of Process Bus technology when applied to an existing circuit with conventional and non conventional instrument transformers (NCIT). The trial consists of an additional GIS NCIT and Process Bus connected feeder protection solution at the new build 400kV substation at Bodelwyddan and conventional analogue protection solutions at the two remote ends – Pentir & Deeside.

The trial equipment is overlaid on the operational protection solution for the circuit and is to be removed at the end of the trial. It is unlikely that NG will remove the GIS NCITs at the end of the trial however some decommissioning costs will be incurred for removing protection relays and ancillary services.

The majority of the funding of the trial is from ABB, with a contribution (notionally £50k) from National Grid to support and direct the trial ambitions. Additional internal resources have been identified to manage the site installation, commissioning and decommissioning of the equipment at the three substations, provide site visits and monitor project performance during the 2 year trial period.

Outputs from the project will drive changes in Policy, Specifications and Application Guidance for future pilot and project installations

Nominated Contact Email Address(es)

box.NG.ETInnovation@nationalgrid.com

Problem Being Solved

Multiple protocols exist for substation automation, which include proprietary protocols with custom communication links. The interoperability of multiple vendors solutions would be a huge advantage for TSOs all over the world. To address the interoperability issue, the IEC created a standard known as 61850 with the intention of creating a single protocol for the complete substation, and promoting the interoperation of systems between OEMs.

This project is addressing a problem (from the protection side) of two points:

- Outage Constraint to replace protection
- Interoperability between different OEM solutions

Method(s)

Demonstration

Previous feasibility study projects (AS3 - National Grid IFI Project) and other university research projects gave us enough information to build an initial strategy. That strategy allowed us to make an informed decision as to a trial solution that can enable the adoption of IEC61850 standard within National Grid, as opposed to our bespoke solutions. This project will run a trial of the appropriate P&C equipment to enable the communication of different manufacturer's equipment.

The project will also demonstrate the compatibility of Non-conventional Instrument transformers, with conventional Instrument Transformers, in service.

Scope

The purpose of the trial is to demonstrate the benefits of Process Bus technology when applied to an existing circuit with conventional and non conventional instrument transformers (NCIT). The trial consists of an additional GIS NCIT and Process Bus connected feeder protection solution at the new build 400kV substation at Bodelwyddan and conventional analogue protection solutions at the two remote ends – Pentir & Deeside.

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Objective(s)

The project objectives are to install protection and control equipment that complies with the IEC61850 standard, at 400kV. Part of this objective will be to address issues that arise with the interface between conventional protection and NCITs.

Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

n/a

Success Criteria

This project will be successful if the IEC standard equipment can be successfully used on site, and interfaced with existing equipment.

Project Partners and External Funding

n/a

Potential for New Learning

n/a

Scale of Project

This project will be focussed on a substation scale.

Technology Readiness at Start

TRL7 Inactive Commissioning

Technology Readiness at End

TRL8 Active Commissioning

Geographical Area

The project will deliver in Bodelwyddan, Pentir & Deeside

Revenue Allowed for the RIIO Settlement

Zero

Indicative Total NIA Project Expenditure

NGET NIA project expenditure is £146,000

Project Eligibility Assessment Part 1

There are slightly differing requirements for RIIO-1 and RIIO-2 NIA projects. This is noted in each case, with the requirement numbers listed for both where they differ (shown as RIIO-2 / RIIO-1).

Requirement 1

Facilitate the energy system transition and/or benefit consumers in vulnerable situations (Please complete sections 3.1.1 and 3.1.2 for RIIO-2 projects only)

Please answer **at least one** of the following:

How the Project has the potential to facilitate the energy system transition:

n/a

How the Project has potential to benefit consumer in vulnerable situations:

n/a

Requirement 2 / 2b

Has the potential to deliver net benefits to consumers

Project must have the potential to deliver a Solution that delivers a net benefit to consumers of the Gas Transporter and/or Electricity Transmission or Electricity Distribution licensee, as the context requires. This could include delivering a Solution at a lower cost than the most efficient Method currently in use on the GB Gas Transportation System, the Gas Transporter's and/or Electricity Transmission or Electricity Distribution licensee's network, or wider benefits, such as social or environmental.

Please provide an estimate of the saving if the Problem is solved (RIIO-1 projects only)

In the region of millions of pounds, as the outage costs currently associated with the installation and replacement of P&C equipment could be reduced significantly.

Please provide a calculation of the expected benefits the Solution

(Estimated costs)

Base = 350,000
Method = 200,000

B-M = 150,000

Please provide an estimate of how replicable the Method is across GB

This can be applied to all sites across the GB Transmission System.

Please provide an outline of the costs of rolling out the Method across GB.

This is unknown until the commercial aspects have been explored, which is dependent on the outcome of this trial.

Requirement 3 / 1

Involve Research, Development or Demonstration

A RIIO-1 NIA Project must have the potential to have a Direct Impact on a Network Licensee's network or the operations of the System Operator and involve the Research, Development, or Demonstration of at least one of the following (please tick which applies):

☑ A specific piece of new (i.e. unproven in GB, or where a method has been trialled outside GB the Network Licensee must justify repeating it as part of a project) equipment (including control and communications system software).

☑ A specific novel arrangement or application of existing licensee equipment (including control and/or communications systems and/or software)

☑ A specific novel operational practice directly related to the operation of the Network Licensees system

☐ A specific novel commercial arrangement

RIIO-2 Projects

☐ A specific piece of new equipment (including monitoring, control and communications systems and software)

☐ A specific piece of new technology (including analysis and modelling systems or software), in relation to which the Method is unproven

☐ A new methodology (including the identification of specific new procedures or techniques used to identify, select, process, and analyse information)

☐ A specific novel arrangement or application of existing gas transportation, electricity transmission or electricity distribution equipment, technology or methodology

☐ A specific novel operational practice directly related to the operation of the GB Gas Transportation System, electricity transmission or electricity distribution

☐ A specific novel commercial arrangement

Specific Requirements 4 / 2a

Please explain how the learning that will be generated could be used by the relevant Network Licensees

n/a

Or, please describe what specific challenge identified in the Network Licensee's innovation strategy that is being addressed by the project (RIIO-1 only)

This project addresses the following area of the Innovation Strategy:

Reliability - Network protection and control: Develop wide area monitoring, protection and control to cope with operating a more complex transmission network

☑ Has the Potential to Develop Learning That Can be Applied by all Relevant Network Licensees

Is the default IPR position being applied?

☑ Yes

Project Eligibility Assessment Part 2

Not lead to unnecessary duplication

A Project must not lead to unnecessary duplication of any other Project, including but not limited to IFI, LCNF, NIA, NIC or SIF projects already registered, being carried out or completed.

Please demonstrate below that no unnecessary duplication will occur as a result of the Project.

n/a

If applicable, justify why you are undertaking a Project similar to those being carried out by any other Network Licensees.

n/a

Additional Governance And Document Upload

Please identify why the project is innovative and has not been tried before

n/a

Relevant Foreground IPR

n/a

Data Access Details

n/a

Please identify why the Network Licensees will not fund the project as apart of it's business and usual activities

n/a

Please identify why the project can only be undertaken with the support of the NIA, including reference to the specific risks(e.g. commercial, technical, operational or regulatory) associated with the project

n/a

This project has been approved by a senior member of staff

☑ Yes